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An Update of Stock Status of 3KLP Lumpfish

by

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[1]La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

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ABSTRACT

Lumpfish roe fishery in divisions 3KLP has been approximately 500 tonnes from 1977 to 1984. Landings reached a high of 3,000 tonnes in 1987 and dropped to an average of 2,000 tonnes from 1988 to 1994. Summaries of landing statistics are provided.
Research vessel indices of biomass and length composition are presented by year and division.

Résumé

La pêche de la lompe oeuvée dans les divisions 3KLP se chiffrait à environ 500 tonnes, de 1977 à 1984. Puis les débarquements ont atteint un sommet de 3 000 tonnes en 1987, pour chuter par la suite à 2 000 tonnes, en moyenne, de 1988 à 1994. Des sommaires des statistiques sur les débarquements sont inclus.

Les indices de la biomasse et de la composition des prises par longueur, obtenus par navire de recherche, sont présentés par année et par division.

Introduction

Lumpfish (Cyclopterus lumpus) are primarily a bottom dwelling species but have been reported to be semipelagic during early life (Davenport 1985).
Spawning takes place during the spring in Newfoundland waters and continues into the summer. The preferred spawning grounds are shallow water rocky shores with abundant seaweed growth. The fishery on this species is primarily based on roe and is prosecuted by vessels less than 65' in Newfoundland bays . This paper describes the commercial fishery from 1986 to 1994 and presents biomass and abundance estimates from research vessels surveys as well as size composition.

Materials and methods

Commercial landings were obtained from Department of Fisheries and Oceans Statistics Branch Newfoundland region. Landings were complied from sale slip records.
Random stratified surveys have been conducted in Division 3K ,3L and subdivision 3Ps since 1977, 1981 and 1972 respectively. These surveys have predominantly been in the autumn for Divisions 3K and 3L. In subdivision 3Ps the timing of the survey has varied from January to June.
Length frequency samples from commercial catches have been collected from Lumsden (3K) Lamaline (3Ps) and Point Crewe (3Ps) for 1988-1990 and 1994.

Results

The Fishery

The commercial fishery began for lumpfish roe in Newfoundland in 1970. Annual landings were < 200t in the early 1970's and averaged 600 metric tons from 1976 to 1984 (table 1 fig 1). Landings increased to a peak of 3 000 metric tons in 1987, due mainly to exceptionally high prices for roe (Stevenson and Baird 1992), but landings declined to an average of 2 000 metric tons from 1988-93. In 1994 landings further declined to 1 500t of roe. This decline was mainly in division 3K and 3L.
The bulk of this fishery has been in May and June except in 1991 when 80% (3K) and 40% (3L) of the landings were in July (table 2). Landings from subdivision 3Ps did not display this temporal shift.
Annual variation in landings between statistical areas(Fig. 2) within a Division has been constant over time (table 3 fig. 3).

Research Surveys

The fall research surveys in the offshore areas of divisions 3K resulted in biomass estimates less than 1 000 t in the early 1980's, increased to 8 000t in 1988 and then decreased to 1 600t for the 1990's (table 4). Division 3L biomass estimates were low in the early 1980's with a slight increase in the mid 80's and then declined to the lowest level in the time series in 1988 and 1989 . Estimates for the 1990's appear to be stable but associated with larger variances (fig 4). Subdivision 3Ps biomass estimates were an order of magnitude higher than Divisions 3K and 3L. When the 3Ps time series is partitioned by season (winter = January to March spring = April to June) the spring portion is comparable to 3K and 3L (fig. 5). Most of the biomass for subdivision 3Ps was in depths of 51 to 100 fathoms (table 5).
Length frequencies from RV surveys in divisions 3K and 3L are not considered representative of the population due to low sample size (fig.6a&b). Modal size of females in subdivision 3Ps ranged from 37 to 42 cm while the males ranged from 28 to 33 cm (fig. 6c).

Length frequencies collected from fishers using 11" gillnets had a modal value of 39 - 45 cm for females (fig 7).

Discussion

The stock structure of this species in Newfoundland waters is not known. Biomass estimates from the RV surveys have been lower for all years in divisions 3K and 3L than 3Ps. This maybe due to the timing of the surveys. The seasonal pattern in survey estimates in subdivision 3Ps are consistent with work by Collins 1976 where he described migration of lumpfish moving inshore in the spring and early summer to spawn in shallower coastal waters and returning to deeper waters offshore in late summer and early fall. As with work done by Blackwood in 1983 with experimental nets, small female lumpfish (<25cm) have not been caught by the survey trawl. Davenport 1985 pointed out that adults remain pelagic until the winter before spring spawning and thus are not available to ground gear.
Biomass estimates from the most recent winter surveys in 3Ps (1993) are half of what they were in 1985 . Landings in 3K have steadily declined since 1992 .Although it is difficult to confirm from the landings database, it is believed that effort has increased in these later years .

Conclusion

With survey biomass estimates from 3Ps declining and landings with similar or higher effort in 3K also declining, it is very likely that this species is being over exploited in Newfoundland waters.

References

Blackwood , G. 1983. Lumpfish roe fishery development in Newfoundland ,1982-83. Nfld. Dept. of fisheries, Industry Support Services, Development Report No. 31,29 p.

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Davenport, J. 1985. Synopsis of biological data on the lumpsucker, *Cyclopterus lumpus* (Linnaeus, 1758),FAO Fish. Synop.,(147). 31p.

Stevenson,S. C., Baird J. W. 1988. The fishery for lumpfish *(Cyclopterus lumpus)* in Newfoundland waters. Can. Tech. Rep. Fish. Aquat. Sci. 1595: iv + 26p.

Table 1. Lumpfish roe landings (tonnes)
NAFO divisions 3K,3L and 3P from 1977 to 1994

	3K	3L	3P	Total
1977	146	252,3		398,3
1978	334,4	376,2	99,9	810,5
1979	236,7	347,8	243,1	827,6
1980	56,8	50	411,7	518,5
1981	111,9	51,6	433	596,5
1982	77,1	22,5	455,8	555,4
1983	105,4	45,9	469,4	620,7
1984	114,3	117	330	561,3
1985	206,5	342,6	426,3	975,4
1986	434,2	460,5	651,2	1545,9
1987	1257	923,4	825,3	3006
1988	800,4	842,6	643,8	2286,8
1989	764,6	896,6	667,2	2328,4
1990	423,5	437	310,8	1171,3
1991	290,3	809,4	989	2088,7
1992	562,5	897,6	487,3	1947,4
1993	294,6	632,8	1514	2441,6
1994	132,9	385,3	994,1	1512,3

Table 2. Summary of Newfoundland lumpfish roe landings for NAFO Divisions 3K, 3L, and 3P by month (landings are in metric tons).

NAFO div. 3K

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1986	0.3	239.8	173.0	21.0	0.2	.	.	434.2
1987	0.1	511.4	621.0	115.5	9.3	0.1	0.0	1257.3
1988	0.0	489.6	242.5	65.2	3.0	0.0	.	800.4
1989	.	577.0	182.4	5.2	0.0	.	.	764.6
1990	.	85.8	303.8	33.9	.	.	.	423.5
1991	.	0.5	36.5	243.6	9.7	.	.	290.3
1992	.	132.3	382.6	47.5	.	.	.	562.5
1993	.	79.1	166.0	49.5	.	.	.	294.6
1994	0.0	52.8	65.7	14.4	.	.	.	132.9
.....								
total	0.4	2168.5	2173.4	595.7	22.1	0.2	0.0	4960.3

NAFO div. 3L

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1986	4.9	198.8	177.2	75.1	4.6	.	.	460.5
1987	0.6	421.6	341.7	134.4	19.2	4.4	1.4	923.4
1988	3.8	393.1	300.0	121.7	20.9	2.6	0.5	842.6
1989	2.6	703.9	183.6	5.8	0.4	0.4	.	896.6
1990	.	160.1	235.6	41.4	.	.	.	437.0
1991	.	110.7	348.1	347.3	3.3	.	.	809.4
1992	.	414.6	436.5	46.4	.	.	.	897.6
1993	.	356.2	227.9	48.7	.	.	.	632.8
1994	0.1	166.2	180.7	38.2	0.1	.	.	385.3
.....								
total	12.1	2925.1	2431.2	859.0	48.5	7.3	2.0	6285.1

NAFO div. 3P

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1986	31.1	338.3	202.5	79.3	0.1	.	.	651.2
1987	5.8	366.0	340.5	107.4	5.2	0.4	0.1	825.3
1988	3.3	308.2	254.3	75.2	1.5	1.1	0.2	643.8
1989	1.6	436.6	209.7	18.4	0.9	.	.	667.2
1990	1.1	144.3	165.4	0.0	.	.	.	310.8
1991	25.8	437.5	430.2	95.4	.	.	.	988.8
1992	12.6	242.6	204.8	27.3	.	.	.	487.3
1993	41.6	607.8	743.5	121.3	.	.	.	1514.2
1994	40.0	414.4	457.2	82.4	0.0	.	.	994.1
.....								
total	162.9	3295.8	3008.0	606.7	7.6	1.5	0.2	7082.7

Table 3. Summary of Newfoundland lumpfish roe landings for NAFO Divisions 3K, 3L, and 3P by statistical area (landings are in metric tons).

NAFO div. 3K

YEAR	A	B	C	D	H	I	K	TOTAL
1986	91.4	342.9	.	.	.	.	.	434.2
1987	493.4	762.5	1.4	.	.	.	.	1257.3
1988	188.0	612.4	.	.	.	.	.	800.4
1989	229.2	535.4	.	.	.	.	.	764.6
1990	141.2	282.0	0.3	.	.	.	.	423.5
1991	57.3	233.0	.	.	.	.	.	290.3
1992	77.3	485.2	.	.	.	.	.	562.5
1993	34.5	259.8	.	.	.	.	0.3	294.6
1994	6.1	126.7	.	0.0	0.0	0.1	.	132.9
.....								
total	1318.4	3639.7	1.8	0.0	0.0	0.1	0.3	4960.3

NAFO div. 3L

YEAR	B	C	D	E	F	G	H	TOTAL
1986	.	262.3	163.7	26.7	7.4	0.3	.	460.5
1987	0.9	468.4	304.3	134.4	14.3	1.1	.	923.4
1988	5.1	397.4	278.0	124.9	7.9	29.3	.	842.6
1989	0.6	473.3	262.5	79.2	1.4	79.7	.	896.6
1990	2.0	221.4	134.4	53.3	0.6	25.0	0.2	437.0
1991	0.2	313.7	293.4	141.3	4.6	56.3	.	809.4
1992	.	471.7	278.3	110.6	17.5	19.2	0.3	897.6
1993	.	248.4	209.5	100.1	19.2	29.4	26.3	632.8
1994	.	117.8	130.3	86.0	25.6	22.7	2.8	385.3
.....								
total	8.8	2974.2	2054.4	856.5	98.5	263.0	29.7	6285.1

NAFO div. 3P

YEAR	B	G	H	I	J	K	TOTAL
1986	.	.	392.6	229.6	29.1	.	651.2
1987	.	.	544.9	208.3	72.1	.	825.3
1988	.	.	463.3	136.0	44.6	.	643.8
1989	.	4.4	522.0	94.3	46.5	.	667.2
1990	.	3.8	224.6	67.1	15.3	.	310.8
1991	.	17.6	682.2	231.1	58.2	.	989.0
1992	.	2.6	235.4	156.5	92.7	.	487.3
1993	.	0.1	747.6	408.3	356.4	1.7	1514.2
1994	0.0	4.4	590.6	221.8	171.4	5.8	994.1
.....							
total	0.0	33.0	4403.2	1752.9	886.3	7.5	7083.0

Table 4. Lumpfish abundance and biomass (kg) estimates from bottom trawl surveys 1972 - 95.

	NUMBERS			WEIGHTS		
YEAR	3Ps	3K	3L	3Ps	3K	3L
1972	2 102 798			8 036 914		
1973	15 798 588			53 063 458		
1974	430 710			1 484 728		
1975	12 895			58 479		
1976	29 406			213 490		
1977	68 768	50 837		296 067	126 585	
1978	5 543 572	96 590		18 540 765	195 486	
1979	18 170 849	1 185 605		66 869 392	3 553 954	
1980	17 529 039	211 005		86 962 610	713 485	
1981	3 344 997	350 911	67 420	15 791 004	1 025 992	443 905
1982	77 272	286 003	280 791	235 078	875 564	761 909
1983	4 840 668	313 022	223 094	18 496 261	773 258	508 639
1984	1 467 543	458 635	67 411	5 782 731	1 060 145	278 869
1985	47 554 409	675 921	847 372	117 415 159	1 556 080	2 422 755
1986	41 423 314	1 667 861	528 852	123 338 105	4 207 716	1 498 327
1987	63 305 191	755 884	1 211 567	155 290 504	1 887 168	3 412 089
1988	18 169 082	3 569 634	122 593	48 585 170	8 282 007	299 254
1989	27 738 774	1 513 148	220 855	83 112 384	3 878 863	447 133
1990	47 526 899	708 850	413 792	91 817 576	1 362 692	1 664 008
1991	42 578 856	1 039,207	1 115 533	93 427 963	2 030 758	3 124 426
1992	22 100 157	262 668	1 860 267	47 012 847	721 965	5 485 819
1993a	34 297 872	77 471	748 823	63 300 923	2 719 970	2 000 553
1993b	17 528 135			37 426 513		
1994	18 447 631	938 449	1 471 716	46 173 676	1 472 047	3 421 660
1995	6 200 010			11 160 290		

a Feburary 1993.
b April 1993.

Table 5. Lumpfish biomass estimates (t) from research vessel surveys in NAFO Division 3Ps.

DEPTH range (fath)	Stratum number	Stratum Area sq. mi.	A1C 197 1972 Mar 29-30	A1C 207 1973 Mar 18-22	A1C 231 1974 Apr 10-20	A1C 236 1975 Jun 2-12	A1C 207 1976 May 11-21	A1C 201 1977 Apr 14-28	A1C 273 1978 Feb 21-28	A1C 287 1979 14 Hr 5 mm	A1C 302 1980 19 mm 3 mm	A1C 310 1981 Mar 7-28	A1C 330 1982 20 mil 3 jul	A0 9 1982 22 mil 8 mil	A0 20 1984 Apr 9-19	Wt 26 1985 Mar 7-26	Wt 45 1986 May 8-22	Wt 95+50 1987 13 Hr 22 mm	Wt 66 1988 27 Jan 14 Hr	Wt 81 1989 Feb 1-18	Wt 81 1990 21 Jan 20 Hr	Wt 103 1991 Feb 2-20	Wt 110 1992 Feb 5-25	Wt 120 1992 Feb 3-25	Wt 126 1992 Apr 1-21	Wt 150 151 1994 Jan 3-20	Wt 166 167 1995 Apr 1-20
0-30	314		348		385		0	74	343	228	730	4021	44	1744	1158	521	2672	478	940	770	5016	205	45	30	1130	284	0
	320			742	0		0			2564	1562	844	0	808	618	3644	12896	4025	980	887	1128	1204	394	109	453	382	127
31-50	309			101	175	0	0	47	238	325	304	287	0	95	0	93	315	87	20	113	65	158	68	87	490	28	0
	312		881	2027	21	58	0	81	4304	188	0	2398	0	650	285	1174	1547	6661	188	830	580	1730	217	282	348	10	0
	315		887	3699	202		0	74		10031	570	0	0	0	526	2718	6910	6040	14383	2188	7528	9134	10021	1643	5795	1010	1300
	321		1890	698	0		0		4024		7383	350	0	241	448	887	1508	3586	282	1258	10771	845	758	110	389	186	0
	325			384			0		675	1287	489	2457	0	0	810	287	895	3104	3508	30838	2161	9568	2074	2744	840	1824	485
	326								388	62	91	90	0	0	0		37	309	841	488	180	434	0	54	0	350	28
	783																									58	
	307		498	522	201	0	0	0	539	2092	888	800	0	208	178	152	2115	880	318	840	1185	3458	488	648	2001	181	0
51-100	311		290	1481	389	0	0	0	3853	5250	778	1558	0	8838	585	31875	28451	2908	820	8187	11688	25838	1114	30581	1588	258	0
	317		85	8078	8	0	0	0		12847	428	87	0	18	287	16307	2388	15409	1128	1788	27818	5128	898	5382	8245	205	84
	318		1809	13691	0	0	0	0		184	538	258	0	22	438	5244	28884	78181	5488	27584		28587	11888	18485	12484	37718	9844
	322			107			213		1484	27884	7898	2235	141	5388	124	15884	5724	8782	4298	1728	5124	824	1828	488	488	824	180
	323		1785	6838			0	0	1588		7181	187	0	0	121	35818	28888	15288	8417	1288	2885	374	883	838	545	2888	2844
	324						6			87	88		58	478	118	1888	388	8823	8488	2428	4728	1238	4248	278	188	83	488
	781																									234	0
	782																									0	0
101-150	308				2	0	0	0	80	58	43	0	0	168	48	98	187	458	112	184	388	2288	251	184	74		
	309			74	2	0	0	18	0	88	15	188	0	0	44	174	288	118	145	88	128	488	8151	457	0	15	0
	310		0	52	28	0	0	0	0	12	0	0	0	0	78	118	54	48	28	18	218	144	28	227	4	11	0
	313		15	3888	0	0	0	0	18	1843	284	82	0	0	0	223	788	0	28	82	238	3822	8828	8	38	0	0
	318		0	11283	0	0	0	0		782	0	0	0	0	0	177	82	188	74	122	1288	538	92		88	9	11
	319		0	71	0	0	0	0		48	0	0	0	0	0		0	18	0	588		443	0	18	28	9	0
	778																									58	18
	780																									18	0
151-200	305		0	58	0		0	0	0	18	0	0	0	0	0	28	21	8	0	0	0	0	0	0	0	0	0	0
	306		0	0	0		0	0		388	0	0	0	0	0	82	178	57	28	0	18	83	14	8	7		0
	307		0		0		0	0		0	0		0		0		0	0	44	48		285	33	0	74	0	0
	315		0	0	1	0	0	0	0	0	0	0	0	0	0	37	18	15	8	12	48	42	0	28	0	0	0
	316		0	0	0		0	0	0	88	88	0	0	25	48	181	478	118	82	188	448	384	0	318	28	38	0
201-300	708									0	0		0	0	0		0	0	0	0		83	0	58	28	0	0
	711											0	0	0	0	25	18	58	0	0	84	18	128	314	0	83	38
	712									0	0	0	0	0	0	185	142	78	0	0	55	5	18	38	0	218	0
	713					0					0	0	0	0	0	127	57	0	13	22	18	228	81	118	38	128	0
	714									0	38	57	0	63		18	88	157	88	188	88	482	242	134	58	188	0
																										234	0
																										0	0
0-30			385	742	385	0	0	74	343	2798	2314	4881	44	2552	1971	4485	18838	4588	1928	1873	8744	2188	288	227	1583	878	127
31-50			3488	7728	478	58	0	282	10825	11843	8835	5888	0	888	1725	5121	11488	19449	18838	28235	27888	17883	19884	4488	7488	2488	18[illegible]
51-100			4347	28248	815	0	213	0	7582	48588	75287	5845	181	14857	1878	108288	82888	18+85	28458	43884	54123	85857	21884	18822	27884	41281	8122
101-150			15	15288	24	0	0	18	88	2827	452	182	0	182	183	778	1182	728	385	844	2348	8188	4828	885	222	187	28
151-200			0	58	1	0	0	0	0	422	84	0	0	25	48	288	218	288	88	188	581	784	47	258	88	38	0
201-300			0	0	0	0	0	0	0	0	38	57	0	63	0	278	218	288	88	122	238	818	442	548	184	551	28
Total			8835	53888	1488	58	218	285	18548	88888	88882	15788	228	18488	5788	117411	122337	2E+85	48587	83187	81818	83428	47812	82388	32428	48178	13181

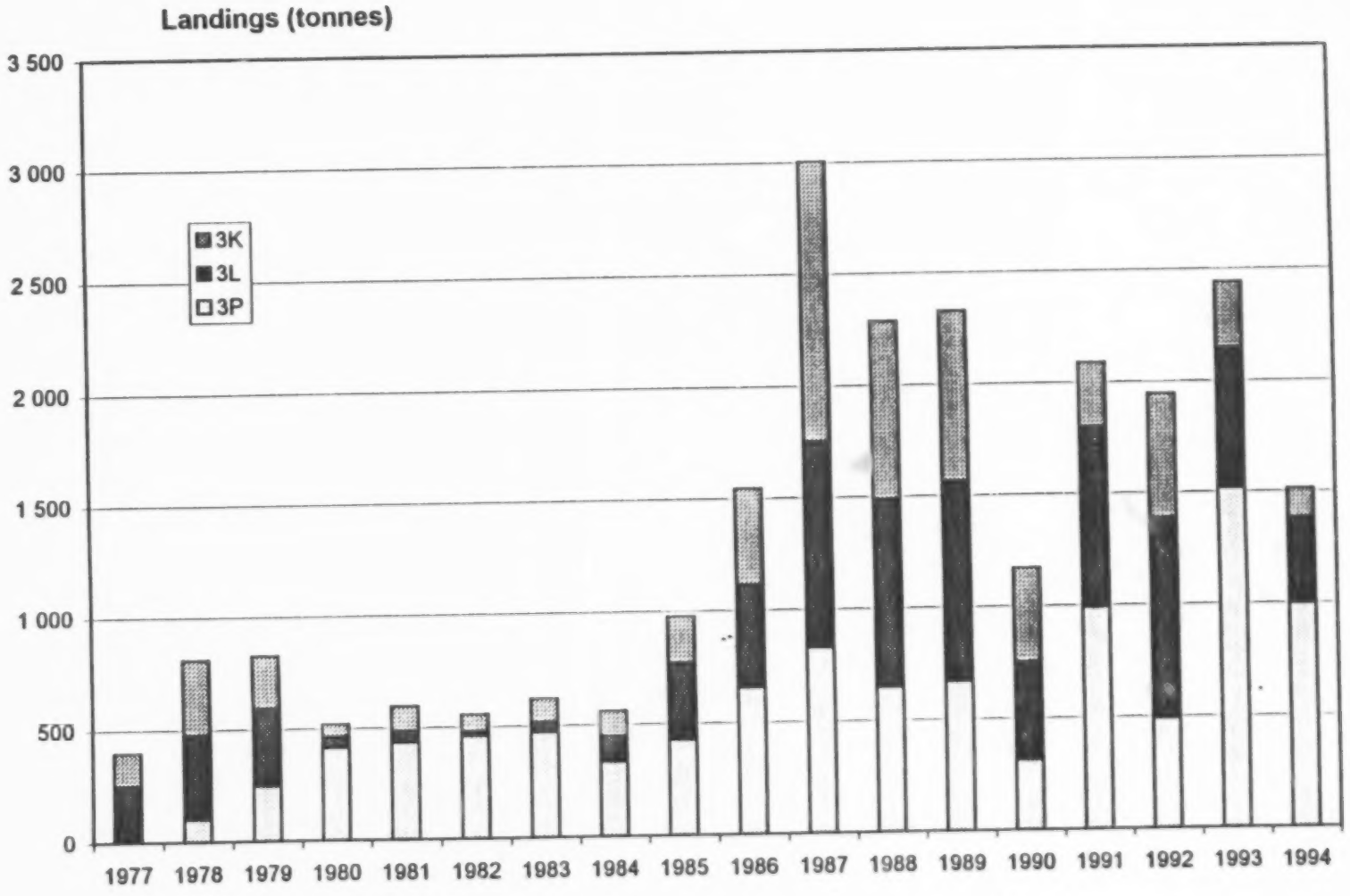

Fig. 1 Lumpfish roe landings for NAFO divisions 3K 3L and 3Ps

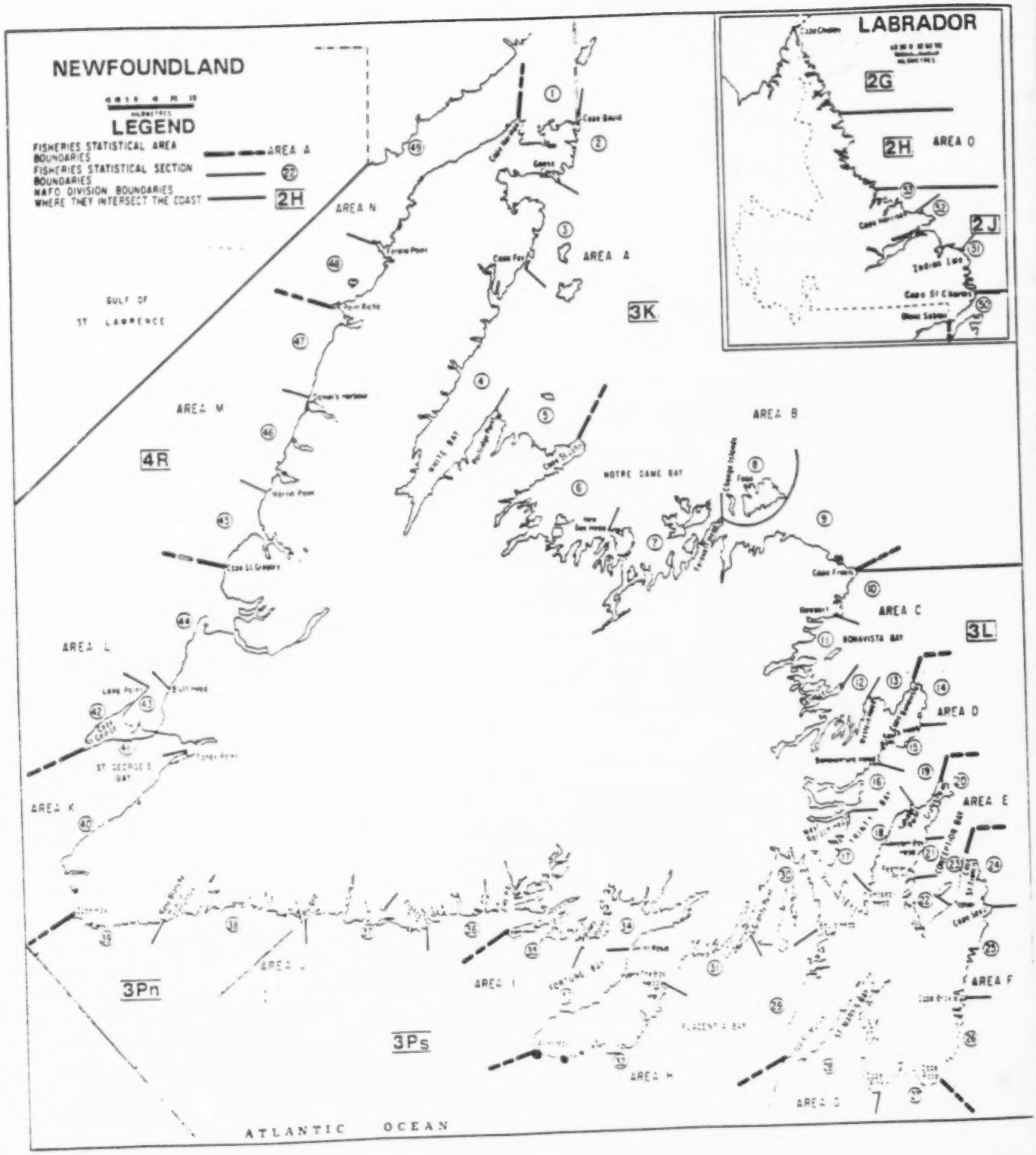

fig. 2 Fisheries Statistical Area of insular Newfoundland.

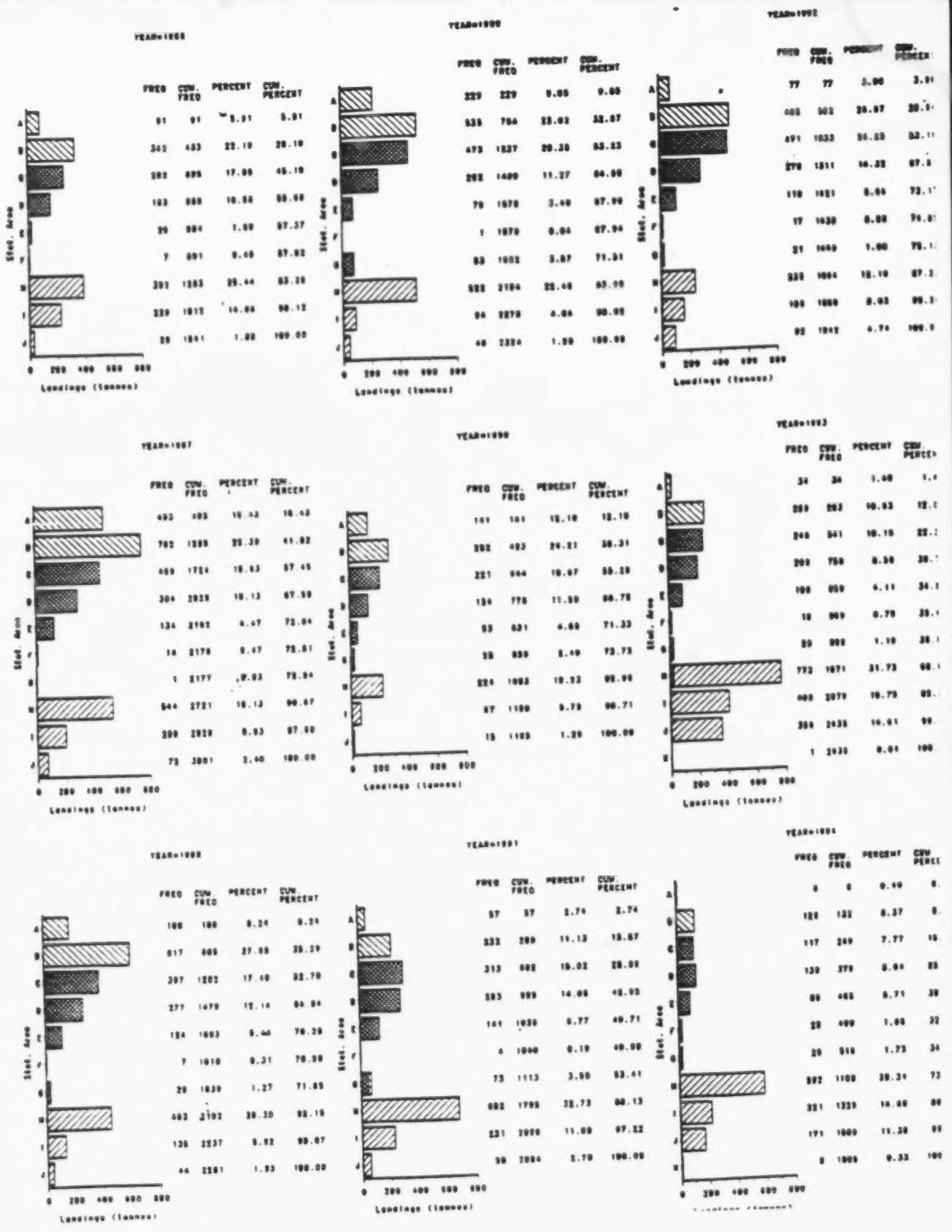

Fig . 3. Summary of Newfoundland lumpfish roe landings by Statistical Area in 3K,3L and 3P .(1986 - 1994)

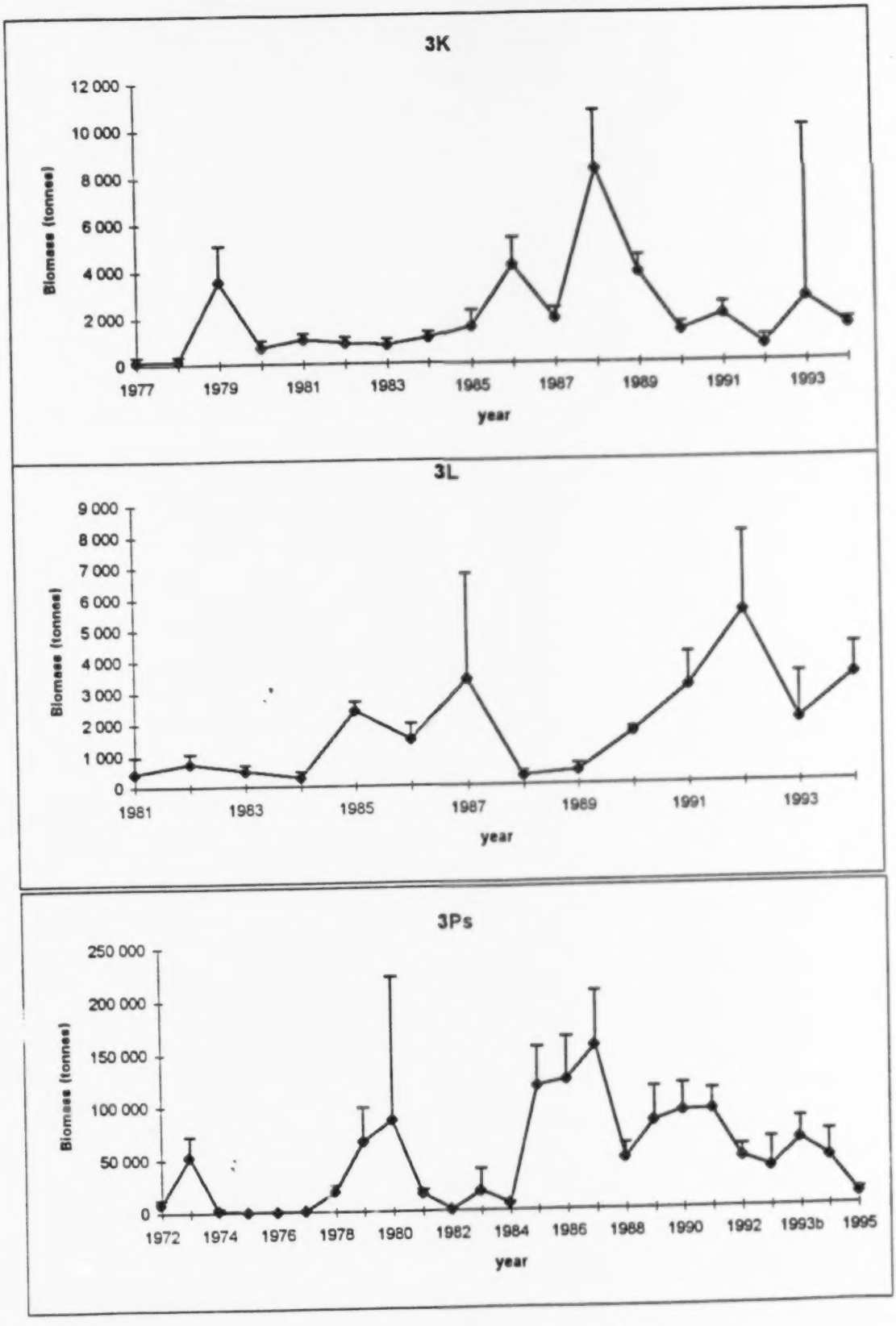

Fig 4. Survey biomass in divisions 3K,3L and subdivision 3Ps (Bars = 1 STD)

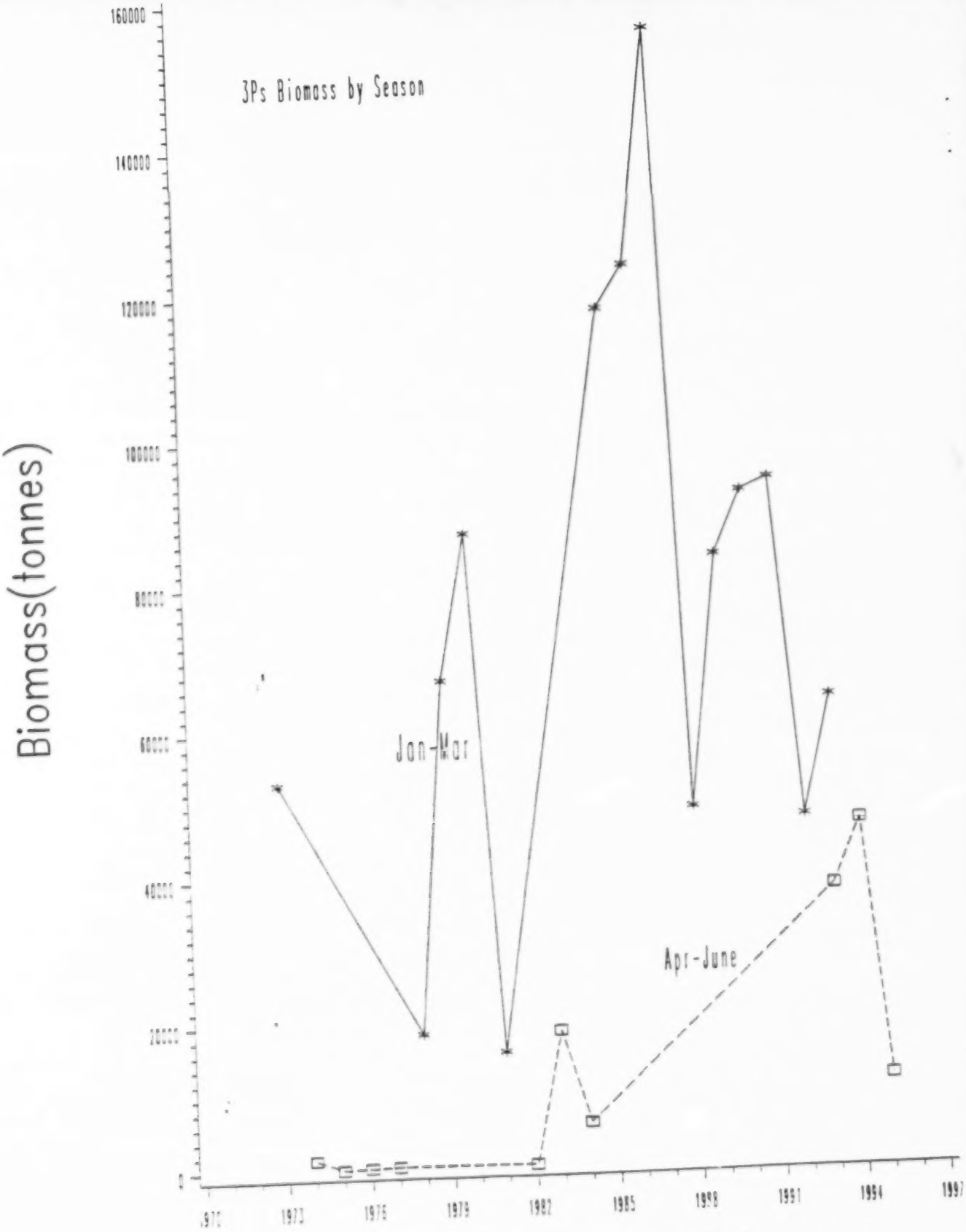

fig 5. Survey biomass in subdivision 3Ps by season.

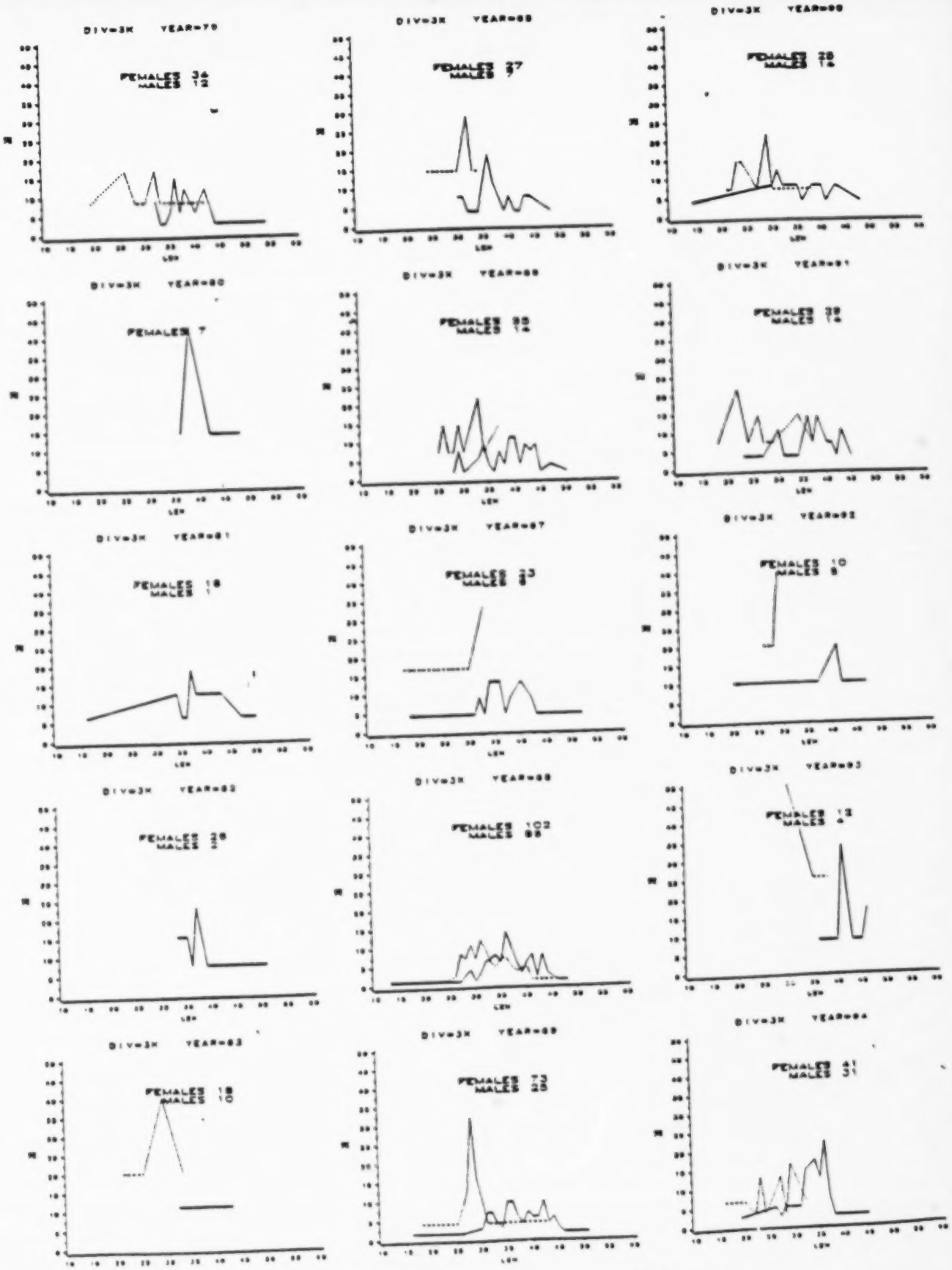

Fig. 4a. Length frequencies from bottom trawl surveys in 3K, 1979-83, 1985-1994

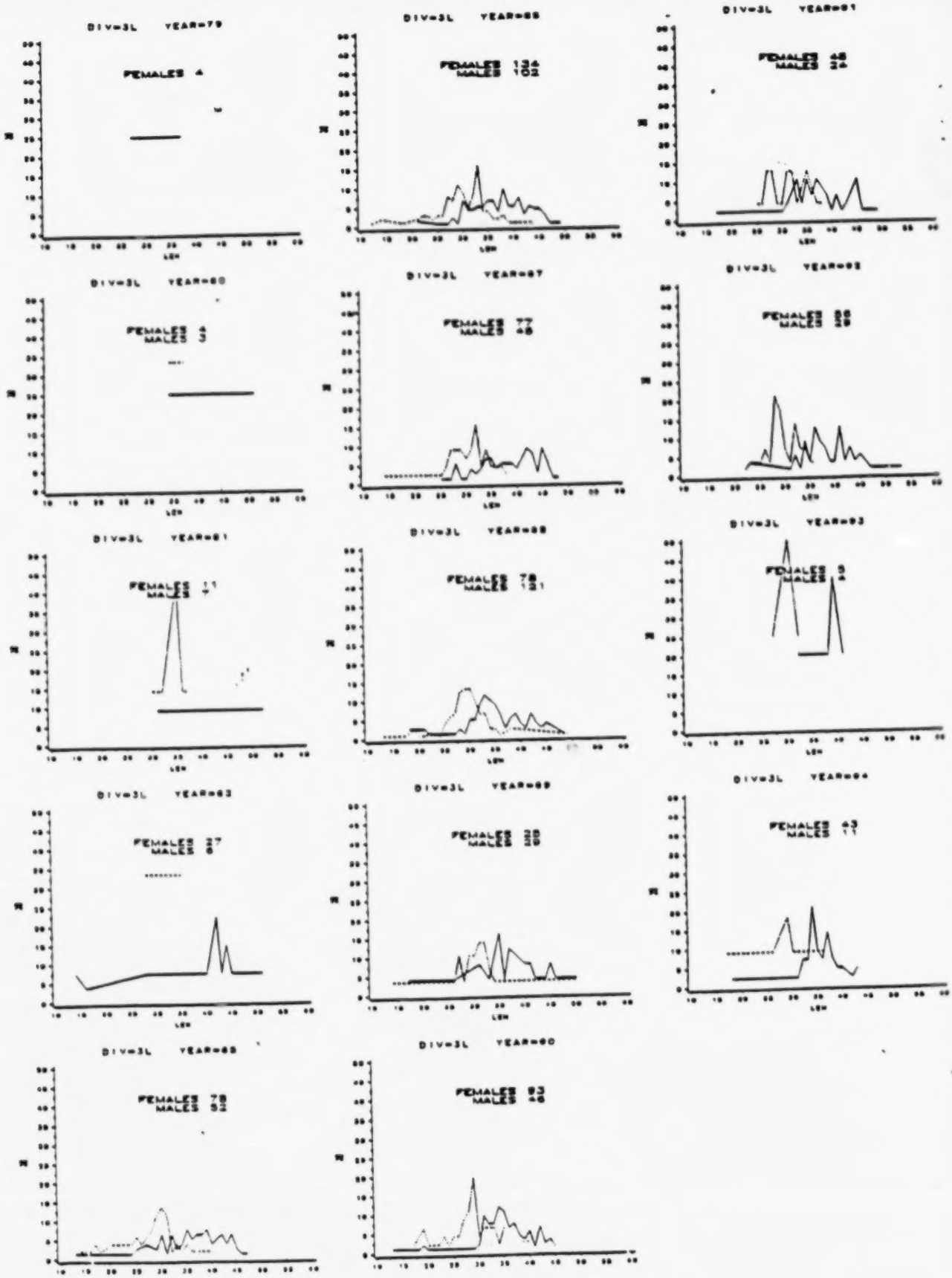

Fig. 6b. Length frequencies from bottom trawl surveys in 3L.. 1979-82 .1985-1994.

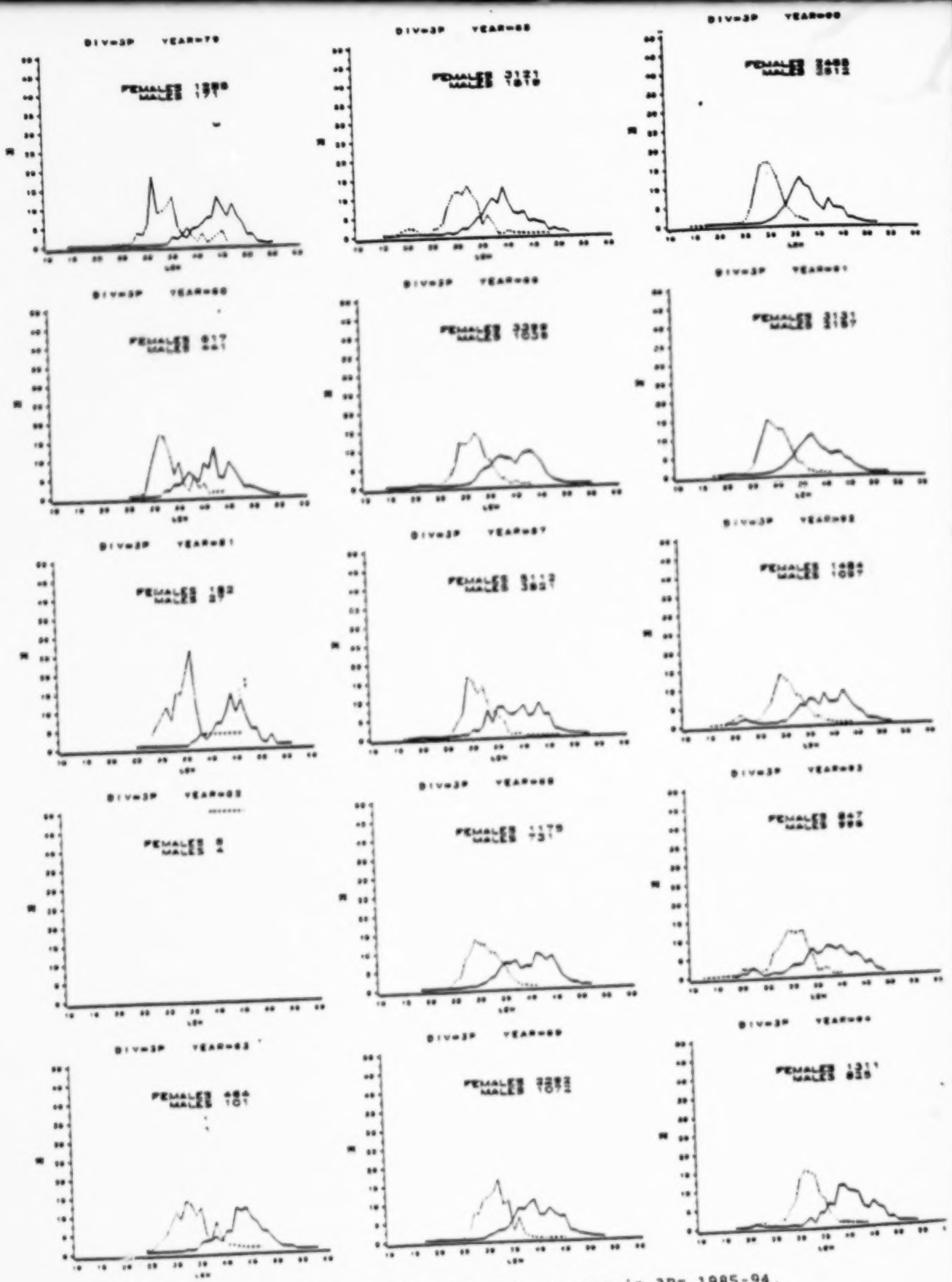

Figure 6c. Length frequencies from bottom trawl surveys in 3Ps 1985-94.

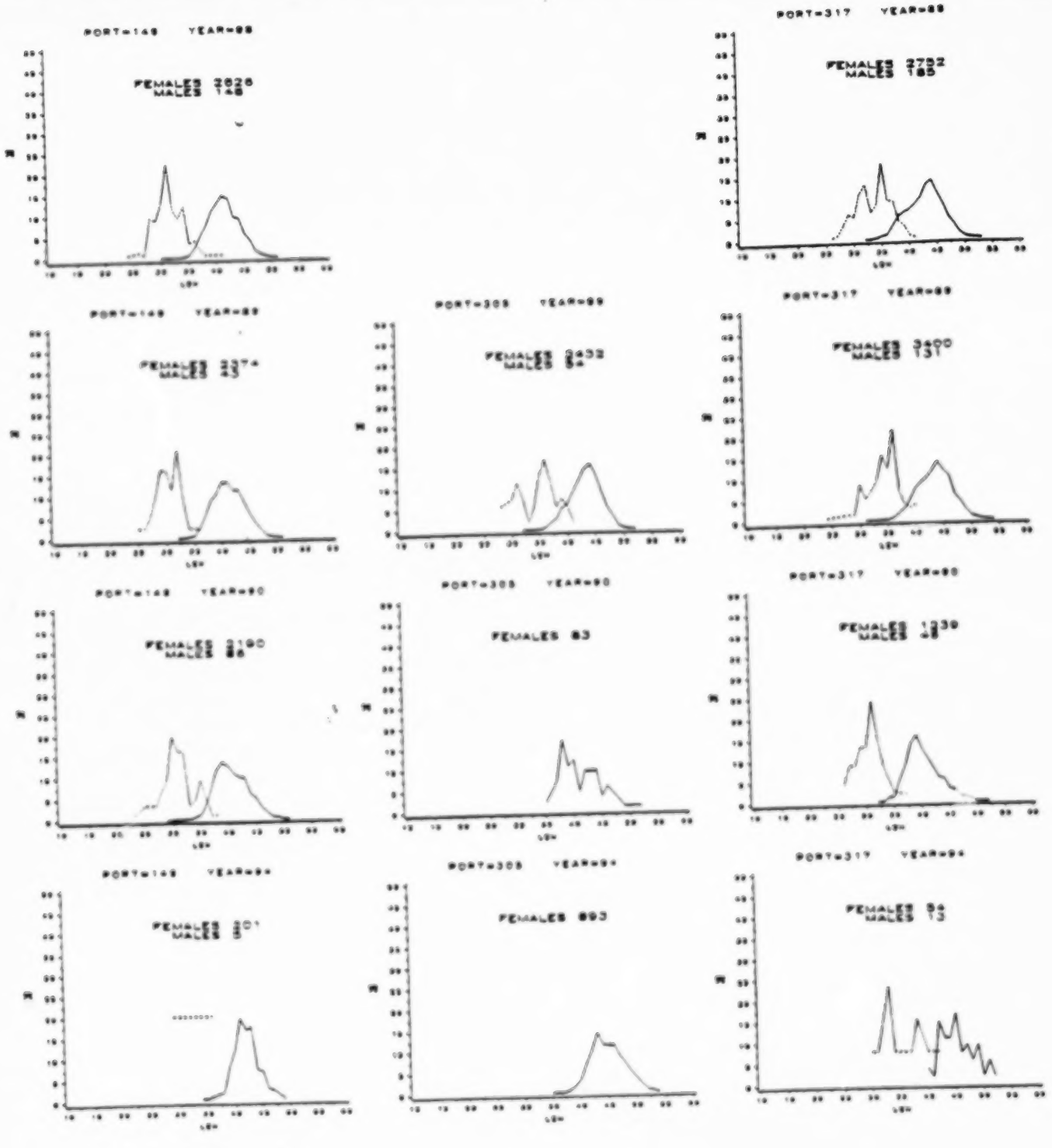

Fig 7. Length frequencies from commercial sample taken at Lumsden ,Port 149, Lamaline ,Port 305 and Point Crewe ,Port 317 for 1988-1990 and 1994.